

# WATER QUALITY M E M O R A N D U M

Utah Coal Regulatory Program

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June 30, 2011

TO: Internal File

THRU: Jim Smith, Permit Supervisor *DSH for*

FROM: Steve Christensen, Environmental Scientist *SCC*

RE: 2010 4<sup>th</sup> Quarter Water Monitoring, Genwal Resources, Inc., Crandall Canyon Mine, Permit & Tracking #3690

Water monitoring requirements for the Crandall Canyon Mine can be found in Sections 7.31.21, *Ground Water Monitoring Plan* and 7.31.22, *Surface Water Monitoring Plan*. Additional information can be found in Tables 7-4, 7-5, 7-8, 7-9 and 7-10.

Water encountered during mining operations was pumped to the portals and discharged to Crandall Creek under UPDES Permit No. UTU0024368. Discharges to Crandall Creek were within the limitations established by the permit with rare exceptions. Prior to 2008 only sample reported an iron concentration greater than 1 mg/L (July 26, 2004 -1.08 mg/L).

Following the mine collapse in August 2007, the pumps were removed from the mine and discharge ceased temporarily. From September 2007 through December 2007 water pooled within the mine, flooding the underground workings. In January 2008 the mine began discharging by gravity flow and has been discharging continuously since. The temporary seals placed in the portals following the collapse required modification to control the mine water discharge. Iron concentrations in the mine water discharge occasionally exceeded 1 mg/L from January to November 2008; and have been greater than 1 mg/L continuously since December 2008. Construction of a mine water treatment system began in December 2009 and was approved by the Division in January of 2010.

Since April of 2010, the mine water treatment system has proven effective in reducing total iron concentrations to within the 1 mg/L UPDES limit. Additionally, the Permittee began sampling the pre-treatment raw mine water (Pre 002) in April of 2010. The sampling of the raw mine water is conducted in an effort to monitor changes in mine water chemistry that might indicate that the iron concentrations are going down. To date, the total iron concentrations in the raw mine-water remain above 1 mg/L.

1. Was data submitted for all of the MRP required sites? YES ☒ NO ☐

### ***Springs***

*The approved MRP requires the monitoring of 24 springs each quarter. Of these 24 springs, 9 require laboratory water quality analysis (See Table 7-4). The remaining 15 springs require quarterly monitoring of field parameters (flow, pH, specific conductance and temperature).*

Data was submitted for all of the required 24 spring monitoring sites. With the exception of spring monitoring point SP-18, the remaining 23 sites reported a measurable flow.

### ***Streams***

*The approved MRP requires the monitoring of 12 surface water/stream sites. Of these 12 surface water/stream sites, 9 require laboratory water quality analysis (See Table 7-8). The remaining 3 sites require quarterly monitoring of field parameters (flow, pH, specific conductance, temperature and dissolved oxygen).*

Data was submitted for all stream monitoring sites. With the exception of stream monitoring site IBC-1 and Little Bear Creek, the remaining 10 stream monitoring sites reported a measurable flow.

### ***Wells***

*The approved MRP outlines monitoring of 7 wells. According to Table 7-4, all 7 wells required quarterly laboratory water quality analysis. However, due to the mine disaster on August 6<sup>th</sup>, 2007, the active mine-workings have been sealed thus rendering the wells inaccessible.*

### ***UPDES***

*The UPDES Permit/MRP (UT000024368) requires monthly monitoring of 2 outfalls: 001 and 002. Outfall 001 is associated with the discharge from the primary sediment pond at the main mine facility. Outfall 002 is associated with the mine-water discharge that reports directly to Crandall Creek.*

Outfall 001 did not report a discharge for this quarter. The required data was submitted for Outfall 002.

### ***Pre-Treatment Mine Water Discharge***

*As part of the permitting process for the mine-water treatment system (Task ID #3461, approved January 27<sup>th</sup>, 2010), the Permittee has committed to monthly sampling of the pre-treatment mine water discharge for the following parameters:*

- *Iron (total, dissolved and ferrous)*
- *Manganese (total and dissolved)*
- *Aluminum (total and dissolved)*
- *Alkalinity*
- *Sulfate*
- *pH*
- *Dissolved Oxygen*

The required Monthly data was collected for the pre-treatment mine water discharge and submitted to the EDI.

2. Were all required parameters reported for each site? YES ☒ NO ☐

### ***Springs***

All required parameters were reported for the spring monitoring sites that produced a measurable flow.

### ***Streams***

All required parameters were reported for the surface water monitoring sites that produced a measurable flow.

### ***Wells***

NA- Since the mine collapse in August of 2007, the monitoring wells are inaccessible.

### ***UPDES***

Outfall 001 did not report a discharge for this quarter. Outfall 002 was sampled each month of the quarter as required by the UPDES discharge permit. All required parameters were reported for Outfall 002.

As part of the approval for the mine-water treatment system (Task ID #3461), the

Permittee committed to obtain additional monthly samples for Outfall 002. The parameters include (D-Fe, FE2+, T-Mn, D-Mn, T-Al, D-Al, Alkalinity and Sulfate). Concentrations were reported for each of the additional parameters at Outfall 002.

### ***Pre-Treatment Mine Water Discharge***

As discussed above, monthly sampling of the Pre-Treatment Mine Water Discharge became a requirement with the approval of the mine-water discharge treatment system.

The required pre-treatment mine discharge parameters were reported this quarter as required.

### **3. Were any irregularities found in the data?**

YES ☒ NO ☐

#### ***Springs***

SP-36 data has historically produced spikes in D-Ca and D-K; the most recent occurring in the 4<sup>th</sup> quarter of 2009. The first and second quarters of 2010 produced D-Ca and D-K values within two standard deviations of the mean. However, a slight increase in D-K concentration was reported 3<sup>rd</sup> quarter 2010. The D-K concentration returned to within two standard deviations this quarter.

Spring site SP-30 reported an elevated conductivity value the previous quarter. The reported conductivity value returned to within two standard deviations this quarter.

TDS concentrations have been fluctuating for spring site SP-58 for two of the last three quarters (2<sup>nd</sup> quarter 2010 and 4<sup>th</sup> quarter 2010). Elevated TDS and conductivity values were reported this quarter.

#### ***Streams***

As the total iron (T-Fe) concentrations in the mine-water discharge began to increase, a concern was that a similar rise would be observed in stream monitoring site LOF-1 (lower Crandall Canyon flume). An upward trend of T-Fe began to surface the second quarter of 2008 in correspondence with the increase in iron concentrations of the mine-water discharge. A T-Fe concentration of 1.479 gpm was reported the fourth quarter of 2009. Once the mine-water treatment system became operational during the 1<sup>st</sup> quarter of 2010, the iron concentrations detected at LOF-1 have dropped significantly. The T-Fe concentration for LOF-1 this quarter was 0.38 ppm.

***UPDES Sites (001 and 002)***

Outfall 001 reported no observable flow for the quarter.

Based upon three sampling events, outfall 002 reported an average flow value of 528 gpm. The T-Fe concentrations of the water discharging from the mine-water treatment basin were well within the 1.0 ppm standard established by the UPDES permit (0.46 ppm, 0.43 ppm and 0.46 ppm for October, November and December respectively). The mine-water treatment system continues to be effective in reducing the T-Fe concentrations to within the UPDES discharge permit limit of 1.2 ppm.

**4. On what date does the MRP require a five-year re-sampling of baseline water data.**

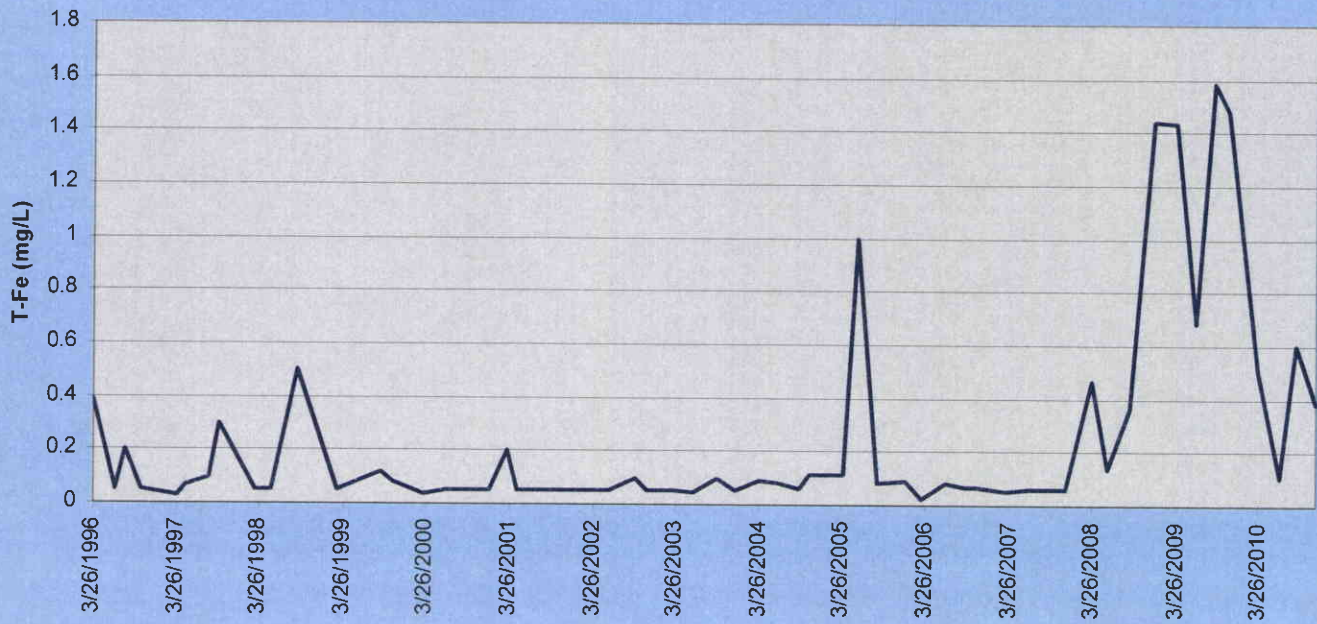
Page 7-33 of the MRP states that groundwater samples collected during the low flow period (typically the 4<sup>th</sup> quarter) every 5 years will be analyzed for baseline parameters (See Tables 7-5). Baseline sampling was conducted this quarter. All required baseline parameters were reported for all ground and surface water monitoring points.

Page 7-35 of the MRP states that surface water samples collected during the low flow period every 5 years will be analyzed for baseline parameters (See Table 7-9). The 4<sup>th</sup> quarter of 2015 will be the next sampling event where baseline data will be required.

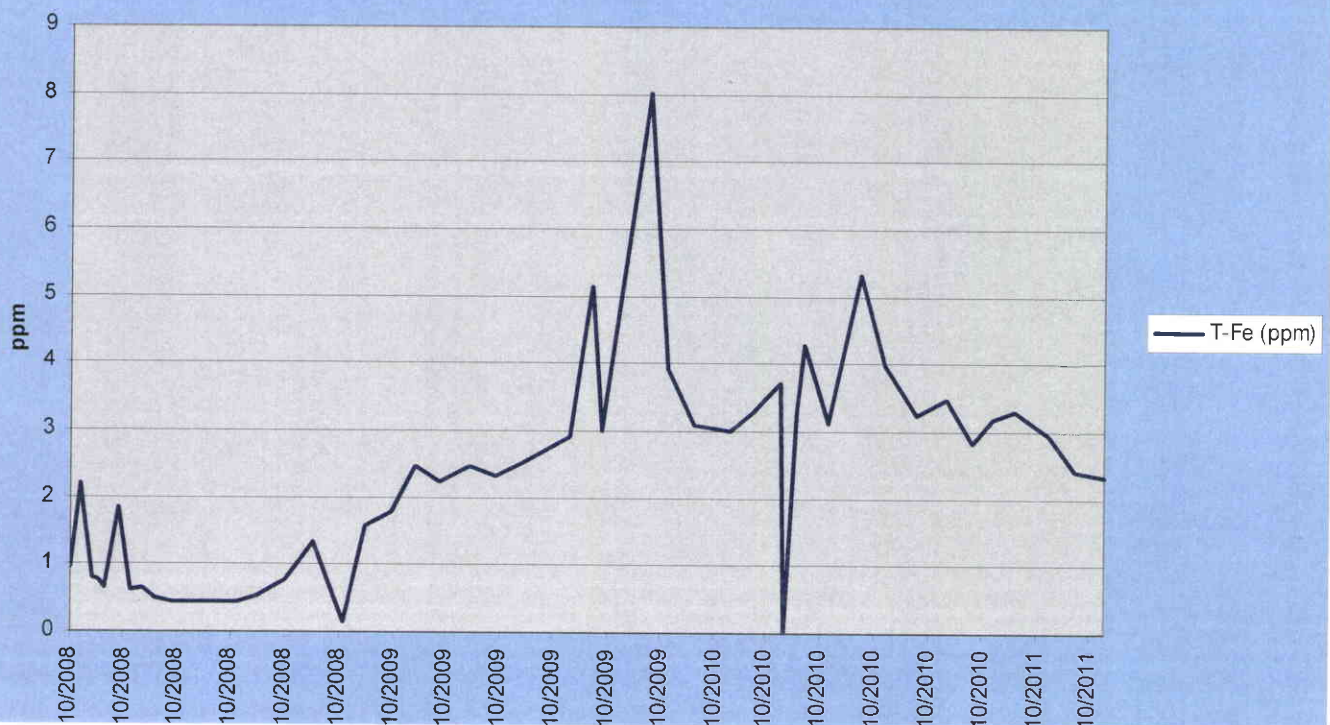
**5. Based on your review, what further actions, if any, do you recommend?**

Continued data collection and monitoring of the mine-water discharge will be necessary to evaluate the effectiveness of the mine-water treatment system. Monitoring of the pre-treatment mine-water will help determine the overall chemistry of the raw mine-water and help determine if the T-Fe concentrations are showing any change in concentration.

### Crandall Creek Lower Flume (LOF-1): Total Iron Levels



### Pre-Treatment Mine Water





## Mine Water Discharge (Outfall 002)

